

The Brain: Utilizing Multi-Sensory Approaches for Individual Learning Styles

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The Central Nervous System is composed of the human brain along with peripheral nervous systems. The brain, however, is the area which receives, processes, and interprets all information to its Peripheral Nervous Systems enabling the body to react.

The human brain is the most complex entity in the universe. The brain is more intricate than the world's most complex computers, while actually transmitting more electricity than a big screen television as you read this article. The brain is composed of one thousand billion billion cells, that is, a 1 with 21 zeros behind it. For our discussion, all thoughts, feelings, and physical actions are a result of the brain's activity.

The cerebral cortex (the area which is responsible for cognitive functioning) separates man from lower animals on the evolutionary ladder. The cortex (also known as the upper brain) is the most recently (evolved) part of the brain. All reasoning is interpreted and processed here.

I. The Cortex is divided into four Lobal

Region:

1. Occipital Lobe
2. Parietal Lobe
3. Frontal Lobe
4. Temporal Lobe

The brain is also divided into two distinct hemispheres (a right hemisphere and a left hemisphere). Research has shown that each hemisphere has greater influence (dominance) than its opposite hemisphere. The specific cognitive task being performed will determine hemispheric dominance.

A group of nerve fibers inter-connecting the right hemisphere and left hemisphere is the Corpus Callosum. Signals transverse (cross over) the corpus callosum from one hemisphere to the other hemisphere.

These are Specific Lobal Functions:

- A. In the Frontal Lobe speech and smell (olfactory) centers are located.

B. The Occipital Lobe houses the location for vision.

C. Sensory areas are located in a fissure (a valley which separate different lobal regions of the brain) of Rolando. Perceptions of Cold, Hot, Pitch, Timbre, and intensity are found here.

D. The Temporal Lobe controls memory.

For a clearer understanding, we briefly need to view neurons (brain cells).

Brain cells consist of protein compound molecules. These compounds are stacked one on top of another like furniture in each individual cell. The neurotransmitters (chemical inducing stimulators) serotonin and norephinepherine stimulate nerve cells activating memory traces previously inert (not active).

A critical relationship between our students and learning in the classroom is association:

Prime Rib Tastes Good

Dance Motion is Enjoyable

This Water is Cold

In education it is absolutely imperative that we assist our students to draw associations from sensory input to neurological processing to expressive output.

Sensory Input	--CNS Processing--	Sensory Output
(Receptive)	(Interpretive)	(Expressive)
	Processing	Output

Regardless of the type of cortex reasoning, the brain draws from an enormous wealth of associations imprinting these thoughts (neurological imprinting). Researchers believe that 90% of an individual's daily perceptions are forgotten. The memory trace becomes dormant; however, upon adequate stimulation, these traces are still retrievable.

Hemispheric Dominance was demonstrated by severing nerve fibers between the left and right hemispheres (a commissurotomy); thus creating (2) brains. The following discoveries were made:

1. Expressive and receptive language, reasoning, and sequencing are found in the left hemisphere.
2. Geometric figures, visual forms, and facial identity are located in the right hemisphere.
3. The right hemisphere is not non-verbal, but once speech has been lateralized left hemispheric dominance for language occurs.

4. 95% of right-handed people have left hemisphere dominance, while 70% of all others still maintain left hemisphere dominance for Language Processing. This is indicative of cerebral hemispheric dominance. (1)

It is important to reiterate that left sensory and motor activities are dominated by the opposite hemisphere in the brain.

When the visual field is arranged so that only the right or left fixation point can be perceived at one time (Half-Visual Field), the dominant (opposite hemisphere) of the brain will become stimulated (occipital lobe excitation). (Harris and Sipay 1985).

However, in some instances, it has been discovered that when the (Half Visual Field) is limited, learning can be accomplished by individual learning strategies. This is important to note for future multi-sensory discussion.

There are more reasons to evaluate a student's individual style. If there is a brain asymmetry or a lack of dominant lateralization (mixed dominance), academic progress may become arrested. Mixed dominance is characterized by a learner not possessing dominance in either the right or left hemisphere. (Harris and Sipay 1985).

Dominance may also be located in the wrong hemisphere. For example, language acquisition may be impaired because an individual's dominance is localized in the right hemisphere (non-language hemisphere).

One brief digression we must make involves the Corpus Callosum (remember the nerve tissue separating the right and left hemisphere). The Corpus Callosum is one of the latest tissues to fully mature in the brain.

Could this be the causal factor which primary teachers point to when describing, "An immature child or a child possessing a maturational lag?"

As teachers, we present most of our lesson (almost without exception) through a singular sensory modality (one sense).

If we allow each child the advantage of multiple modalities or senses (think of it as duel performance), wouldn't each child have a far greater probability that he or she would be able to draw many more associations. More simply, by using multi-sensory techniques, we, as educators, will be able to stimulate more neural pathways within the brain. Even more simply, aren't we just covering all the bases.

Here are some simple multi-sensory teaching techniques which can be easily implemented. Your skills and creativity will make lesson activities almost limitless. The first strategy is simple but it is a personal favorite of mine.

Even kinesthetic activities such as dance and or arm movements can maximize sensory learning. Dance steps or routines can be utilized to teach younger students basic addition and subtraction facts.

The sensory strips in the fissure of Rolando are like a trick mirror. Your fingers and hand have a larger area in the sensory strip than your entire arm combined. Moreover, your toes and feet have a larger strip than all of your entire body mass from your ankle all the way up to your head.

By giving a basic outline of the brain and its relationship to learning and introducing ideas utilizing multi-sensory approaches, it is hopeful that more research can be conducted in areas directly affecting the classroom teacher. The backbone of education, the classroom teacher, can develop a myriad of programs using multisensory techniques in their classroom.

In summary, this technique is not a panacea. So much is not known about the brain's complexity; however, with God's good graces and the advantages of modern science, we can discover and develop new learning paths for future generations of children.

Do You See What I See?

Materials Needed: Reading Textbook, a tape recorder, audio cassette.

Step 1: The teacher will tape a passage or page onto a cassette (amount and passage is teacher discretionary).

Step 2: Have student attempt to silently read page (visual mode), and then have student orally record his reading (oral expressive mode).

Step 3: Place cassette in and have student listen to tape (auditory receptive mode) while reading passage (auditory receptive, and visual receptive).

Step 4: Have students retape their passage a second time (oral expression, visual input).

Step 5: Listen to the first and second taping (auditory input) noting the mistakes and corrections made (allowing the brain to receive, interpret, and process auditory input).

This practice implements generalized stimulation through auditory, and visual reception, and oral expressive modalities.

You Can't Touch It

Another technique involves tactile-motor-kinesthetic modalities. It should be noted that this strategy is more effective among younger students or Special Education students.

Material needed is interchangeable, but they need to have distinct feelings of shape, contour and texture. Examples would be a pencil, a spongy ball, a ruler, and wool sweater.

Can't Touch It

Step 1: The student must first be blindfolded. Have students reach down into a burlap bag, select one item with their LEFT HAND very carefully, touching and caressing the article. Remove blindfold.

Step 2: Have students return to their seat and then close his/her eyes. Have students visualize the item they/kit (Revisualization).

Step 3: Have student write all adjectives which they can think of on paper.

Step 4: Repeat Step 1, except this time pick up identical items with their RIGHT HAND.

Step 5: Re-visualize object in mind (eyes again closed). Write down any additional adjectives which come to mind.

Step 6: Use adjective compilation to develop sentence structure, paragraph development, story writing, divergent thinking, and convergent thinking are all examples of closure.

Braille: You've got to Be Kidding

Materials needed are popular books and novels that are commensurate with your student's reading abilities. Also required are Braille designed books identical to normal printed books. Braille books are available at public libraries and at private organizations such as the Lighthouse for the Blind.

Step 1: Learning Braille will be easy (not consuming great amount of lesson time) for your students. Remember already sighted, these students will already be utilizing visual-tactile multi-sensory modalities enabling adaptive learning. Your students will also really enjoy this.

Step 2: Have students read a single page of standardized print book.

Step 3: Using brainstorming, have students write down all characters, events and details.

Step 4: Have students reread the identical material in the Braille publication.

Step 5: Have teacher directed questions expanded to include interrogative, exploratory, and affective questions for greater comprehension.

Step 6: Open up culmination with classroom discussion, more detailed writing, or even dramatization or dance.

* Thanks to the assistance of Kenneth Freedman whose help was immeasurable.

(1) Harris, A.J. & Sipay, E.R. (1985) Correlates of Reading Disabilities II: Neurological, Physiological and Physical Factors. L. Akers, I. Glynn, D. Kleiner (Eds.) (pp. 280-285) White Plains, N.Y., Longman Inc.

SCOTT B. CHRISTIE 3782 W. 76th Place Chicago Illinois 60652-1340

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